REMARKS

Claims 1-2, 4-14 and 17-31 remain pending in the application, with claims 1 and 9-11 having been previously withdrawn. Claim 3 has been canceled without prejudice or disclaimer. Claims 2, 22, 23, 27, and 28 have been amended without introduction of new matter. Favorable reconsideration is respectfully requested in view of the above amendments and the following remarks.

The courtesy extended by the Examiner to Applicant's representative during a telephonic interview conducted on July 7, 2005 is noted with appreciation. During that interview, the parties discussed the Examiner's interpretation of the existing independent claims, and possible claim amendments that would be considered to expedite a favorable examination of this application. Other aspects of the interview are discussed in the following remarks.

The allowance of claims 5-8, 13, 18, 20, and 21 is gratefully acknowledged. Applicant notes that claim 14 was neither rejected nor allowed in the Office Action. This appears to have been an oversight on the part of the Office. Since claim 14 depends from independent claim 5, it is expected that claim 14 will likewise be allowed.

Claims 2-4, 12, 17, and 19 are again rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Umeda et al. (U.S. Patent No. 5,420,850). This rejection is respectfully traversed.

Claim 3 has been canceled, thereby rendering the rejection of this claim moot.

Turning to the remaining rejected claims, as explained in Applicant's previous response, the various embodiments all relate to interference estimation in a Code Division Multiple Access (CDMA) communication system. In such a system, interfering signals are allowed to share the same frequency at the same time. This is achieved by, on the transmitter side, multiplying each signal with a unique spreading code sequence. The signals are then scrambled and transmitted on the common channel in overlapping fashion as a composite signal. Each mobile receiver correlates the composite signal with a respective unique despreading code sequence to thereby extract the signal addressed to it. See, for example, pages 1-2 in Applicant's specification.

One characteristic of such a system is that signals that are not addressed to a mobile receiver assume the role of interference. To achieve reliable reception of a signal, the ratio of the signal to the interference should be above a prescribed threshold for each mobile station

(referred to as a required signal-to-interference ratio, or SIR_{req}). Being able to accurately measure the level of interference that occurs concurrently with the desired signal is, therefore, very important in CDMA systems because that measurement forms the basis for any of a number of different power control mechanisms that are employed to make sure that each signal contributing to the composite signal is transmitted at neither too strong nor too weak a power level.

The Background section of Applicant's disclosure describes a number of known techniques for measuring the interference. One of these, referred to as "a third method", is described on page 6, lines 16-24 as follows:

> A third method ... involves correlating the received signal with the channelization code allocated to the connection during a time when nothing is being transmitted to the mobile station. Since there is no "wanted" signal, despreading the received signal would then yield a good estimate of the interference. A problem with this approach is that the mobile station has to know when no information is being transmitted to it. This could be solved by having predetermined time-instants of no transmission, but such a solution has a certain capacity loss, since the interference measurement would need to be updated quite regularly.

Applicant's methods and apparatuses for estimating interference take an entirely different approach. In embodiments defined by independent claim 2, a method for estimating interference comprises the steps of "*reserving at least one code in a set of codes for interference measurement only*; receiving a composite signal; and *estimating said interference at a receiver using said at least one reserved code*." [Emphasis added.]

It is well known that "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). In the present instance, independent claim 2 is not anticipated by Umeda et al. at least because Umeda et al. fail to disclose or even suggest reserving at least one code in a set of codes for interference measurement only, and then using that reserved code to estimate interference in the composite signal.

Instead, Umeda et al. disclose a technique in which the same code is used to both obtain the desired information, and to estimate the interference. This is made quite clear in Umeda et al. at, for example, column 7, lines 19-63, which begins by "supposing that the power of the overall interference signal component in the overall received signal despread every period T_p (i.e. the output from the correlation detector 22) is distributed uniformly throughout one cycle period T_p and that the power of the desired signal (i.e. the received signal in the control channel under measurement) mostly concentrates in the window...."

On this basis, Umeda et al. estimate the interference as follows: The total signal power P_W in the window a-b after despreading is determined in accordance with the integral shown in Equation (1). The window a-b is illustrated in Figure 3 and also in Figure 6A. It can be seen that this is the time interval during which the correlation between the code and the received signal is at its peak; thus the power accumulated during this interval includes power associated with the desired information, as well as power associated with interference.

Next, the total interference signal power P_I distributed outside the window after despreading is determined in accordance with the integral shown in Equation (2). The intervals of integration 0-a and b-T_p are shown in Figure 6A. It can be seen that this is the time interval during which the correlation between the code and the received signal is at its minimum; thus the power accumulated during this interval is assumed to represent power associated only with interference.

It should now be recognized that the measurement P_I cannot, itself, be taken as the desired measure of interference because the time duration of this measurement far exceeds the time duration of the window during which the desired information is present. Umeda et al. solve this problem by relying on their initial assumption that "power of the overall interference signal component in the overall received signal despread every period T_p ...is distributed uniformly throughout one cycle period T_p and that the power of the desired signal (i.e. the received signal in the control channel under measurement) mostly concentrates in the window". On this basis, they determine the ratio (W/T_P) of the width W of the window a-b to the period T_P (with $W<<T_P$), and then assume that this fraction multiplied by the power accumulated outside the window (i.e., P_I) is a good approximation of the power of the interference signal component within the window. See Umeda et al. at col. 7, lines 46-55.

Thus, Umeda et al. describe an approach to interference measurement that is at least similar to the "third method" described in the Background section of Applicant's disclosure

in that a code normally used for obtaining the desired information from a signal is also used to despread the signal at a time when it is assumed that no information is being transmitted.

It should now be readily apparent that the Umeda et al. patent does not anticipate Applicant's claimed invention because Umeda et al. do not "reserve" any code "for interference measurement only." Instead, Umeda et al. use the same code for both extracting the desired information and performing interference measurement.

Despite these arguments, which were presented in Applicant's last-filed Amendment, the Office remains unpersuaded. In the above-mentioned telephonic interview, the Examiner explained that the phrase "reserving ... for interference measurement only" in the method claim is not considered by the Office to rule out using the code for interference measurement for very limited periods of time, such as is taught in Umeda.

Applicant respectfully disagrees with the Office's claim interpretation. Nonetheless, in the interest of expediting favorable prosecution, independent claim 2 has been amended to now further define that "reserving" is performed "such that said at least one code is never used for transmitting signals." Support for this amendment may be found in the specification at, for example, page 7, lines 14-17 ("The reserved code is not used (or is rarely used) for spreading traffic and, therefore, provides an estimate of the interference associated with a received signal when a receiver correlates the received signal with the reserved code."); page 13, line 22 through page 14, line 1 ("Since the reserved interference measurement code is never (or at least not typically) transmitted in the forward link, by correlating the received forward link signal with the reserved code, the result would be an estimate of the interference including intra-cell interference, inter-cell interference and thermal noise."); and original claim 3 ("The method of claim 2, wherein said at least one reserved code is not used for transmitting signals.").

Considering these cited portions in conjunction with the statement, found on page 6, lines 16-24, of the problem associated with only sporadically leaving the code unused for transmissions ("... A problem with this approach is that the mobile station has to know when no information is being transmitted to it. This could be solved by having predetermined time-instants of no transmission, but such a solution has a certain capacity loss, since the interference measurement would need to be updated quite regularly,"), it is quite evident that one skilled in the art to which the invention pertains would readily understand that the phrase "reserving ... for interference measurement only" means that the code is substantially never

used for anything other than interference measurement. The present amendment, then, merely expressly sets forth what had already been inherently defined by the claim.

For at least the foregoing reasons, independent claim 2, as well as the dependent claims 4, 12, 17, and 19 are believed to be patentably distinguishable over the Umeda et al. patent. Accordingly, it is respectfully requested that the rejection of claims 2, 4, 12, 17, and 19 under Section 102(b) be withdrawn.

Claims 22-31 stand rejected under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the written description requirement. More particularly, the Office objects that the recitation in independent claims 22 and 27 about "a probability that the composite signal includes a transmitted signal ... is low enough to permit the interference at the receiver to be reliably estimated" was not described in the specification.

Applicant respectfully disagrees that the subject claim elements are not supported by the description. However, in the interest of expediting favorable prosecution, the recitation concerning "probability" has been canceled in each of independent claims 22 and 27, and replaced by a definition that "the second spreading code is reserved for interference measurement such that the second spreading code is not typically used for spreading traffic." (Emphasis added) Support for these amendments may be found in the specification at, for example, page 7, lines 14-17 ("The reserved code is not used (*or is rarely used*) for spreading traffic and, therefore, provides an estimate of the interference associated with a received signal when a receiver correlates the received signal with the reserved code." – emphasis added); and page 13, line 22 through page 14, line 1 ("Since the reserved interference measurement code is never (*or at least not typically*) transmitted in the forward link, by correlating the received forward link signal with the reserved code, the result would be an estimate of the interference including intra-cell interference, inter-cell interference and thermal noise." – emphasis added).

To accommodate the changes to claims 22, and 27 respective dependent claims 23 and 28 have been amended so that they now each recite "wherein the composite signal never includes a transmitted signal representing a data stream that has been spread by means of the second spreading code." Support for these amendments may be found in the application passages cited in the previous paragraph, for example.

It is believed that the meaning of this new claim recitation would be readily understood by one of ordinary skill in the art, especially when considered in light of the

specification as a whole. For example, the text spanning page 12, line 21 through page 14, line 3 explains, *inter alia*, how the RAKE receiver of Figure 7 can be used to generate an estimate of the interference associated with the received signal by despreading the received signal with a reserved interference measurement code. Since the reserved interference measurement code is never (or at least not typically) transmitted in the forward link, by correlating the received forward link signal with the reserved code, the result would be an estimate of the interference including intra-cell interference, inter-cell interference and thermal noise. If this correlation is performed for each selected path in the de-spreading process, a good estimate of the interference per path is obtained.

The skilled artisan would readily understand that the extent to which the power of the despread signal serves as a good estimate of interference is directly related to the extent to which the code can be relied on as not being used by any transmitter to encode information. If a code is selected that is rarely or not typically used, as expressly taught in the application, it may still be quite useful most of the time for providing reliable interference measurements. The exact extent to which a code should be left unused in order for it to be able to serve this purpose would be a design parameter to be selected based on the requirements of any particular embodiment.

For the foregoing reasons, the present amendments are supported by the specification and are believed to bring independent claims 22 and 27, as well as their respective dependent claims 23-26 and 28-31 well within compliance with all of the requirements of 35 U.S.C. § 112. Accordingly, it is respectfully requested that the rejection of claims 22-31 under the first paragraph of Section 112 be withdrawn.

The application is believed to be in condition for allowance. Prompt notice of same is respectfully requested.

Respectfully submitted,
Potomac Patent Group PLLC

Date: July 8, 2005

By: _____
Kenneth B. Leffler
Registration No. 36,075

P.O. Box 855
McLean, Virginia 22101-0855
703-718-8884

I hereby certify that this correspondence is being sent by facsimile transmission to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 to the following facsimile number:

Facsimile Number: 703 872 9306
Date of Transmission: July 8, 2005

_____
Kenneth B. Leffler